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**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GLENN RESEARCH CENTER
CLEVELAND, OH**

**JUSTIFICATION FOR OTHER THAN
FULL AND OPEN COMPETITION (JOFOC)**

1. **This document is a justification for other than full and open competition prepared by the NASA Glenn Research Center.**
2. **The nature and/or description of the action being approved:** NASA Glenn Research Center in Cleveland, OH plans to conduct research measurements on turbine sections of aircraft propulsion systems. Accurate measurement of overall turbine performance requires accurate measurement of torque and rotation speed. This justification provides the rationale for contracting by other than full and open competition to design, fabricate, and calibrate a torquemeter, coupling, and high-speed shaft system. It is also required that the vendor design and fabricate a torquemeter pedestal support mount.
3. **Description of the supplies or services required, include an estimated value:**

The estimated dollar value for this procurement is _____, this estimate was derived from pricing for similar items across a number of other agencies as well as government personnel expertise in should-costs analysis.
4. **Statutory authority permitting other than full and open competition:** This acquisition will be a sole-source procurement in accordance with 6.302-1(a)(2)(i). Only one responsible source and no other supplies or services will satisfy agency requirements.
5. **A demonstration that the proposed contractor's unique qualifications or the nature of the acquisition requires use of the authority cited:** A sole-source award for this procurement is requested to Torquemeters, Ltd. For the following reasons.
 - NASA has a requirement for operation of several classes of turbines in W-6 with different torque ratings from 2,500 lbft. to 10,000 lbft. In order to have the most accurate measurement possible, an interchangeable shaft is necessary to optimally have the twist of the shaft rated for the amount of torque being measured. Torquemeters, Ltd. is the only company which manufactures torquemeters with interchangeable shafts.
 - The torquemeter must measure torque through phase displacement measurements, which removes the electronics from the rotating shaft and positions them in a stationary casing of the torquemeter. There can be no shaft

strain gage susceptibility to vibration influence of the torque measurement. It appears that Torquemeters, Ltd. is the only company which manufactures torque meters using this principle.

- The torque meter must have the capability of zero torque datum adjustments which eliminates the no load residual torque variation with speed. This correction must also be input into the torque meter readout.
- Couplings must also have integrated failsafe teeth which will engage if the couplings are being over-torqued which is needed to protect the diaphragms from damage. They must also engage if the diaphragms fail which is needed for safety to prevent over-speed and failure of the turbine.
- The proposed product must also interface with other components currently utilized at NASA GRC.

6. **Description of the efforts made to ensure that offers are solicited from as many potential sources as practicable:** The Government intends on releasing a notice on a Governmentwide point of entry (GPE), FedBizOpps. (www.fbo.gov) to notify vendors of its intentions.

7. **Description of the market survey conducted, and the results, or a statement of the reasons a market survey was not conducted:** Market research was conducted on the world wide web, Request for Information (RFI), GSA Advantage, NASA GRC Enhanced Procurement Data Warehouse (EPDW), and Federal Procurement Data System (FPDS). The following results were found:

The Internet - found that there was only one source that could provide the described products in accordance with all of the technical specifications, the vendor identified was Torquemeters, Ltd

Request For Information (RFI) – NASA issued an RFI on June 25, 2013 and received one response. After review of the response and capability statement from the vendor, it was determined they could not comply with the stated requirements. The information provided in the response did not give any information on the torque sensor being proposed but mentions the use of strain gages. Strain gages have been found to be less accurate for this type of requirement and NASA Glenn Research Center intends to use phase change measurement systems which measure shaft twist as described in the SOW. The response advocated for wireless telemetry in lieu of wired instrumentation. W-6 must use wired instrumentation for this torque meter. It should also be noted that this will be a new shaft design so it will be designed with a bore for the wires. This is being incorporated from the beginning of the design.

Therefore it would result in significant cost to the Government if NASA Glenn was to completely change direction and go with a different design.

Furthermore, the response did not address providing a drive shaft system. This is a highly specialized piece of equipment that requires flex couplings and must have a failsafe.

The Torquemeters Ltd. torquemeter has no rotating electronics so there is no need for a slip ring, telemetry, or any other means to acquire a torque signal. As mentioned, it measures shaft twist. The slip rings referenced in the SOW are for rotating instrumentation on the test article (turbine) not the torquemeter and the shaft bore is necessary to accommodate the instrumentation-to-slip ring wiring.

Future facility upgrades, which are beyond the scope of this SOW, may include telemetry to replace the slip rings but this torquemeter/drive shaft design must include the shaft bore.

GSA Advantage – NASA procurement searched GSA advantage for similar type products and none were identified.

NASA GRC EPDW – Resulted in no similar type orders or any previous orders placed with Torquemeters, Ltd

FPDS – This search identified three previous Government procurements for similar products. The first was with the Department of the Navy, this agency also purchased a Torquemeter instrument. It should be noted that out of all the Government's acquisitions of such instruments, this was the only one found that was similar to the current requirements. It should be also noted that the instrument purchased from the NAVY was also purchased from Torquemeters, Ltd. This clearly demonstrates that there limited sources for such a product with Torquemeters, Ltd. being one of the primary providers.

8. Other facts supporting the use of other than full and open competition: Such as:

- a. Explanation of why technical data packages, specifications, engineering descriptions, statements of work, or purchase descriptions suitable for full and open competition have not been developed or are not available.

NASA research indicated that Torquemeters, Ltd.'s technical capabilities represent a unique and innovative concept that other industry entities do not provide. These requirements are unique in specific operation specifications and design elements. Torquemeters is capable of adhering to the needed safety requirements to ensure successful performance of the requirement. In order to comply with all the needed requirements, the Government cannot create a technical data package, specifications, engineering descriptions, statements of work, or purchase descriptions suitable for full and open competition.

9. Sources, if any, that expressed an interest in writing in the acquisition: No other sources have expressed interest in writing in the acquisition.
10. The actions, if any, the agency may take to remove or overcome any barriers to competition before any subsequent acquisition for the supplies or services required:

The Government will be taking a look at its current infrastructure and requirements in the future to see if full and open competition can be achieved with meeting required specifications with alternative means (currently none identified). The Government is also willing to seek advisement from industry.